

SEQUENCE LISTING

<110> Inouye, Masayori  
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Qing, Guoliang  
Suzuki, Motoo

<120> mRNA Interferases and Methods of Use Thereof

<130> University of Medicine & Dentistry of New Jersey (601-1-131PCT)

<140> 10/560,303  
<141> 2005-12-12

<150> PCT/US2004/018571  
<151> 2004-06-14

<150> 60/543,693  
<151> 2004-02-11

<150> 60/478,515  
<151> 2003-06-13

<160> 92

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aaaggtagcg agcaagctgg acatcgcca gctgttgtcc tgagtccctt catgtacaac 120  
aacaaaacag gtatgtgtct gtgtgttcct tttacaacgc aatcaaaagg atatccgttc 180  
gaagttgttt tatccggtca ggaacgtgat ggcgttagcgt tagctgatca ggtaaaaaagt 240  
atcgccgtgc gggcaagagg agcaacgaag aaaggaacag ttggccccaga ggaattacaa 300  
ctcattaaag cccaaattaa cgtactgatt ggtag 336

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Phe Asp Pro Thr Lys Gly Ser Glu Gln Ala Gly His Arg Pro Ala Val  
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Val Leu Ser Pro Phe Met Tyr Asn Asn Lys Thr Gly Met Cys Leu Cys  
35 40 45  
Val Pro Cys Thr Thr Gln Ser Lys Gly Tyr Pro Phe Glu Val Val Leu  
50 55 60  
Ser Gly Gln Glu Arg Asp Gly Val Ala Leu Ala Asp Gln Val Lys Ser  
65 70 75 80  
Ile Ala Trp Arg Ala Arg Gly Ala Thr Lys Lys Gly Thr Val Ala Pro  
85 90 95  
Glu Glu Leu Gln Leu Ile Lys Ala Lys Ile Asn Val Leu Ile Gly  
100 105 110

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gttgttgtgc cggtaaccag cggaggcaat ttggcccgca ctggccgctt tgcggtgtcg 180  
ttggatggtg ttggcatacg taccacaggt tttgtacgtt gcgatcaacc ccggacaatt 240  
gatatgaaag cacggggcgg aaaacgactc gaacgggttc cggagactat catgaacgaa 300  
gttcttggcc gcctgtccac tattctgact tga 333

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His Glu Gln Gln Gly Thr Arg Pro Val Leu Ile Val Thr Pro Ala Ala  
20 25 30  
Phe Asn Arg Val Thr Arg Leu Pro Val Val Val Pro Val Thr Ser Gly  
35 40 45  
Gly Asn Phe Ala Arg Thr Ala Gly Phe Ala Val Ser Leu Asp Gly Val  
50 55 60  
Gly Ile Arg Thr Thr Gly Val Val Arg Cys Asp Gln Pro Arg Thr Ile  
65 70 75 80  
Asp Met Lys Ala Arg Gly Gly Lys Arg Leu Glu Arg Val Pro Glu Thr  
85 90 95  
Ile Met Asn Glu Val Leu Gly Arg Leu Ser Thr Ile Leu Thr  
100 105 110

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ttaatgcagg cgctcaatctt gaatattgtat gatgaagtga agattgacctt ggtggatggc 120  
aaattaatta ttgagccagt gcgtaaagag cccgtattta cgcttgctga actggtaaac 180  
gacatcacgc cggaaaacctt ccacgagaat atcgactggg gagagccgaa agataaggaa 240  
gtctggtaa 249

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Ile Pro Ala Thr Leu Met Gln Ala Leu Asn Leu Asn Ile Asp Asp Glu  
20 25 30

Val Lys Ile Asp Leu Val Asp Gly Lys Leu Ile Glu Pro Val Arg  
35 40 45  
Lys Glu Pro Val Phe Thr Leu Ala Glu Leu Val Asn Asp Ile Thr Pro  
50 55 60  
Glu Asn Leu His Glu Asn Ile Asp Trp Gly Glu Pro Lys Asp Lys Glu  
65 70 75 80  
Val Trp

<210> 7  
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<213> E. coli

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ctgctgaatg cgctgtctct gggcacagat aatgaagttt gcatggtcat tgataatggc 120  
cggctgattt ttgagccgta cagacccccg caatattcac tggctgagct actggcacag 180  
tgtgatccga atgctgaaat atcagctgaa gaacgagaat ggctggatgc accggcgact 240  
ggtcaggagg aaatctga 258

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Val Gly Met Val Ile Asp Asn Gly Arg Leu Ile Val Glu Pro Tyr Arg  
35 40 45  
Arg Pro Gln Tyr Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn  
50 55 60  
Ala Glu Ile Ser Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Thr  
65 70 75 80  
Gly Gln Glu Glu Ile  
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<212> PRT  
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<220>  
<223> T54 to K77 fragment of E. coli MazE

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Thr Leu Ala Glu Leu Val Asn Asp Ile Thr Pro Glu Asn Leu His Glu  
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Asn Ile Asp Trp Gly Glu Pro Lys  
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<210> 10  
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<212> PRT  
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<220>  
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Pro Lys

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<400> 11  
uaagaaggag auauacauau gaaucaaauc 30

<210> 12  
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<212> DNA  
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<210> 13  
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<212> DNA  
<213> Artificial Sequence

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<223> single stranded oligonucleotide

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<210> 14  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> synthetic oligonucleotide

<400> 14  
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<210> 15  
<211> 27  
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<220>  
<223> DNA primer

<400> 15	
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<212> DNA	
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<223> DNA primer	
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<210> 18	
<211> 24	
<212> DNA	
<213> Artificial Sequence	
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<212> DNA	
<213> Artificial Sequence	
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<210> 21	
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gauuugauuc auauguaau cuccuucuuua		30
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<210> 28		
<211> 22		
<212> DNA		
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<223> DNA primer		
<400> 28		22
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<212> DNA		
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<223> synthetic oligonucleotide		
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<211> 18		
<212> DNA		
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<210> 32		
<211> 12		
<212> DNA		
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<223> DNA fragment		
<400> 32		12
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<210> 33		

<211> 60  
<212> DNA  
<213> Artificial Sequence

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<210> 34  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> DNA primer

<400> 34  
caggagauac cucaaugauc a 21

<210> 35  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> DNA primer

<400> 35  
ctcaatgatc acaggagata c 21

<210> 36  
<211> 21  
<212> DNA  
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<220>  
<223> DNA primer

<400> 36  
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<210> 37  
<211> 16  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> DNA primer

<400> 37  
ggcacaggag atacct 16

<210> 38  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> DNA primer

<400> 38  
 tgtccttat ggagttacta gtg 23

<210> 39  
 <211> 330  
 <212> DNA  
 <213> *Bacillus halodurans*

<400> 39  
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 ggtttgcgg tggtttgtcc aattaccaga caacaaaaag gttatcctt tgaaatagaa 180  
 ataccaccgg ggttacctat tgaaggggtt attcttactg accaagtaaa aagtctggat 240  
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 ttacaactta ttcatacatt tttatcttaa 330

<210> 40  
 <211> 363  
 <212> DNA  
 <213> *Staphylococcus epidermidis*

<400> 40  
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 gggggagtaa gacctgtagt tattcattcaa aatgatactg gtaataaata tagtccaact 120  
 gtaattgttag ctgcgattac tgatgggatt aataaagcga aaataccaac ccacgtagaa 180  
 attgaaaaga aaaagtataa attagacaaa gattcagttt ttcttcttga acaaattaga 240  
 acactagata aaaagcgttt aaaagaaaaa ttaacatttt tatcagagag taaaatgata 300  
 gaggttgata atgccttaga tattagtttggattaaata actttgatca tcataaatct 360  
 taa 363

<210> 41  
 <211> 411  
 <212> DNA  
 <213> *Staphylococcus aureus*

<400> 41  
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 gggggagtca gacctgtagt cataattcaa aatgatactg gtaataaata tagtccatca 120  
 gttatttttgcggcaataac tggtaggatt aataaagcga aaataccgac acatgttagag 180  
 attgaaaaga aaaagtataa gttggataaa gactcagttt tattttaga acaaattcgt 240  
 acacttgata aaaaacgatt gaaagaaaaa ctgacgtact tatccgatga taaaatgaaa 300  
 gaagtagata atgcactaat gatttagtttggctgaatg cagtagctca accagaaaaa 360  
 tttaggcgtctt attatatgtt ttttcagag ataaataaaa tatttgatata a 411

<210> 42  
 <211> 351  
 <212> DNA  
 <213> *Bacillus subtilis*

<400> 42  
 ttgattgtaa aacgcggcga tggtttatttt gctgattttat ctcctgttgt tggctcagag 60  
 caaggcgggg tgcggccgggt ttttagtgatc caaaatgaca tcggaaatcg cttcagccca 120  
 actgctatttgcgttgcggccat aacagcacaa atacagaaag cgaaatttacc aacccacgtc 180  
 gaaatcgatg caaaacgcta cggtttgaa agagattccg ttattttgct ggagcaaatt 240  
 cggacgatttgcgttgcggccat aacagcaaag gttaacggat aagattactc atctggatga tggatgtatg 300  
 gataagggttgcgttgcggccat acaaatttacc ttggcactca ttgattttta g 351

<210> 43  
 <211> 324  
 <212> DNA  
 <213> *Neisseria meningitidis*

<400> 43

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gaaatcaaaa agacacgtcc ttgtgtcgta gtctctcctc ctgaaataca caactatctc 120  
aagactgtgc tgatcgttcc catgacgagc ggaagccgtc ctgcccgtt ccgcgtcaat 180  
gtccgcttc aggataaaaga cggttgcctt ttgcccgaac agattaggc tggataaaa 240  
gccggattgg tcaaacatct tggcaattta gacaacagta cggtgaaaa actgtttgca 300  
gtattgcagg agatgttgc ctga 324

<210> 44  
<211> 366  
<212> DNA  
<213> Morganella morgani

<400> 44  
atgcgccggc ggctggtcag gagaaatct gacatggaaa gagggaaat ctggcttgc 60  
tcgcttgacc ctaccgcagg tcacgacagc cagggAACgc ggccggact gattgtcacg 120  
ccggctgctt ttaaccgcgt gaccgcctg cctgttgc tgccctgtac cagcggaggt 180  
aattttgccc gcacagcagg cttgtctgtc tcgcttgacg ggcggcat acgtaccacc 240  
ggcgttgtgc gttgcgtatca accccggacg atcgatatga aagccgcgg cggcaaacga 300  
ctcgaacggg tgccagagac tatcatggac gacgttcttg gccgtctggc caccatccctg 360  
acctga 366

<210> 45  
<211> 321  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 45  
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caacgcgggc ggcgtacgc cgtggtcatc agcccccgtc cgatccgtg gagtgttagta 120  
accgtgggtgc cgacgtcgac aagccccaa cctgcgggtt tccgaccaga gctggaagt 180  
atgggaacaa agacacgggtt cctgggttatc cagatccgga cgatccgtc cgtctatgt 240  
cacggcgatc cggtcgacta tctggaccgt gacccaaatgg ccaagggtgaa acacgcgtg 300  
gcacgatacc ttggtctgtc 321

<210> 46  
<211> 109  
<212> PRT  
<213> Bacillus halodurans

<400> 46  
Met Pro Val Pro Asp Arg Gly Asn Leu Val Tyr Val Asp Phe Asn Pro  
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Gln Ser Gly His Asp Gln Ala Gly Thr Arg Pro Ala Ile Val Leu Ser  
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Pro Lys Leu Phe Asn Lys Asn Thr Gly Phe Ala Val Val Cys Pro Ile  
35 40 45  
Thr Arg Gln Gln Lys Gly Tyr Pro Phe Glu Ile Glu Ile Pro Pro Gly  
50 55 60  
Leu Pro Ile Glu Gly Val Ile Leu Thr Asp Gln Val Lys Ser Leu Asp  
65 70 75 80  
Trp Arg Ala Arg Asn Phe His Ile Lys Gly Gln Ala Pro Glu Glu Thr  
85 90 95  
Val Thr Asp Cys Leu Gln Leu Ile His Thr Phe Leu Ser  
100 105

<210> 47  
<211> 120  
<212> PRT  
<213> Staphylococcus epidermidis

<400> 47  
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1 5 10 15

Gly Ser Glu Gln Gly Gly Val Arg Pro Val Val Ile Ile Gln Asn Asp  
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 Thr Gly Asn Lys Tyr Ser Pro Thr Val Ile Val Ala Ala Ile Thr Asp  
   35           40           45  
 Gly Ile Asn Lys Ala Lys Ile Pro Thr His Val Glu Ile Glu Lys Lys  
   50           55           60  
 Lys Tyr Lys Leu Asp Lys Asp Ser Val Ile Leu Leu Glu Gln Ile Arg  
   65           70           75           80  
 Thr Leu Asp Lys Lys Arg Leu Lys Glu Lys Leu Thr Phe Leu Ser Glu  
   85           90           95  
 Ser Lys Met Ile Glu Val Asp Asn Ala Leu Asp Ile Ser Leu Gly Leu  
   100          105          110  
 Asn Asn Phe Asp His His Lys Ser  
   115          120

<210> 48  
 <211> 136  
 <212> PRT  
 <213> Staphylococcus aureus

<400> 48  
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 Gly Ser Glu Gln Gly Gly Val Arg Pro Val Val Ile Ile Gln Asn Asp  
   20           25           30  
 Thr Gly Asn Lys Tyr Ser Pro Thr Val Ile Val Ala Ala Ile Thr Gly  
   35           40           45  
 Arg Ile Asn Lys Ala Lys Ile Pro Thr His Val Glu Ile Glu Lys Lys  
   50           55           60  
 Lys Tyr Lys Leu Asp Lys Asp Ser Val Ile Leu Leu Glu Gln Ile Arg  
   65           70           75           80  
 Thr Leu Asp Lys Lys Arg Leu Lys Glu Lys Leu Thr Tyr Leu Ser Asp  
   85           90           95  
 Asp Lys Met Lys Glu Val Asp Asn Ala Leu Met Ile Ser Leu Gly Leu  
   100          105          110  
 Asn Ala Val Ala Gln Pro Glu Lys Leu Gly Val Tyr Tyr Met Tyr Phe  
   115          120          125  
 Ser Glu Ile Asn Lys Ile Leu Ile  
   130          135

<210> 49  
 <211> 116  
 <212> PRT  
 <213> Bacillus subtilis

<400> 49  
 Met Ile Val Lys Arg Gly Asp Val Tyr Phe Ala Asp Leu Ser Pro Val  
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 Val Gly Ser Glu Gln Gly Gly Val Arg Pro Val Leu Val Ile Gln Asn  
   20           25           30  
 Asp Ile Gly Asn Arg Phe Ser Pro Thr Ala Ile Val Ala Ala Ile Thr  
   35           40           45  
 Ala Gln Ile Gln Lys Ala Lys Leu Pro Thr His Val Glu Ile Asp Ala  
   50           55           60  
 Lys Arg Tyr Gly Phe Glu Arg Asp Ser Val Ile Leu Leu Glu Gln Ile  
   65           70           75           80  
 Arg Thr Ile Asp Lys Gln Arg Leu Thr Asp Lys Ile Thr His Leu Asp  
   85           90           95  
 Asp Glu Met Met Asp Lys Val Asp Glu Ala Leu Gln Ile Ser Leu Ala  
   100          105          110  
 Leu Ile Asp Phe  
   115

<210> 50  
<211> 115  
<212> PRT  
<213> Neisseria meningitidis

<400> 50  
Met Tyr Ile Pro Asp Lys Gly Asp Ile Phe His Leu Asn Phe Asp Pro  
1 5 10 15  
Ser Ser Gly Lys Glu Ile Lys Gly Gly Arg Phe Ala Leu Ala Leu Ser  
20 25 30  
Pro Lys Ala Phe Asn Arg Ala Thr Gly Leu Val Phe Ala Cys Pro Ile  
35 40 45  
Ser Gln Gly Asn Ala Ala Ala Arg Ser Ser Gly Met Ile Ser Thr  
50 55 60  
Leu Leu Gly Ala Gly Thr Glu Thr Gln Gly Asn Val His Cys His Gln  
65 70 75 80  
Leu Lys Ser Leu Asp Trp Gln Ile Arg Lys Ala Ser Phe Lys Glu Thr  
85 90 95  
Val Pro Asp Tyr Val Leu Asp Asp Val Leu Ala Arg Ile Gly Ala Val  
100 105 110  
Leu Phe Asp  
115

<210> 51  
<211> 121  
<212> PRT  
<213> Morganella morganii

<400> 51  
Met Arg Arg Arg Leu Val Arg Arg Lys Ser Asp Met Glu Arg Gly Glu  
1 5 10 15  
Ile Trp Leu Val Ser Leu Asp Pro Thr Ala Gly His Glu Gln Gln Gly  
20 25 30  
Thr Arg Pro Val Leu Ile Val Thr Pro Ala Ala Phe Asn Arg Val Thr  
35 40 45  
Arg Leu Pro Val Val Val Pro Val Thr Ser Gly Gly Asn Phe Ala Arg  
50 55 60  
Thr Ala Gly Phe Ala Val Ser Leu Asp Gly Ala Gly Ile Arg Thr Thr  
65 70 75 80  
Gly Val Val Arg Cys Asp Gln Pro Arg Thr Ile Asp Met Lys Ala Arg  
85 90 95  
Gly Gly Lys Arg Leu Glu Arg Val Pro Glu Thr Ile Met Asp Asp Val  
100 105 110  
Leu Gly Arg Leu Ala Thr Ile Leu Thr  
115 120

<210> 52  
<211> 118  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 52  
Met Met Arg Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg  
1 5 10 15

Gly Ser Glu Ala Asn Asn Gln Arg Pro Ala Val Val Val Ser Asn Asp  
20 25 30  
Arg Ala Asn Ala Thr Ala Thr Arg Leu Gly Arg Gly Val Ile Thr Val  
35 40 45  
Val Pro Val Thr Ser Asn Ile Ala Lys Val Tyr Pro Phe Gln Val Leu  
50 55 60  
Leu Ser Ala Thr Thr Gly Leu Gln Val Asp Cys Lys Ala Gln Ala  
65 70 75 80  
Glu Gln Ile Arg Ser Ile Ala Thr Glu Arg Leu Leu Arg Pro Ile Gly  
85 90 95  
Arg Val Ser Ala Ala Glu Leu Ala Gln Leu Asp Glu Ala Leu Lys Leu  
100 105 110  
His Leu Asp Leu Trp Ser  
115

<210> 53  
<211> 243  
<212> DNA  
<213> Deinococcus radiodurans

<400> 53  
atgacgagtc aaattcagaa atggggcaac agcctcgcbc tccgcattcc caaagctctg 60  
gcccgcagg tggactgac gcagagttca gaagtggagc tgcttcttca ggacggtcag 120  
attgtcatcc ggccagttcc tgctcggcag tacgatctcg ccgcgcgtct ggccgaaatg 180  
acacctgaaa atctgcatgg ggaaacagac tggggcgcac tggaggacg cgaggaatgg 240  
taa 243

<210> 54  
<211> 246  
<212> DNA  
<213> Bacillus halodurans

<400> 54  
gtgacactca tgactactat aaaaaagtgg ggaaatagtt tagctgttcg tattccgaac 60  
cattatgcta aacatattaa cgttacgcaa ggatctgaaa ttgaactaag cttagggagt 120  
gatcaaacga ttatTTaaa gcctaaaaaa agaaagccaa cattagagga attagtggca 180  
aaaatcactc ctgaaaacag acataacgaa attgatttcg ggagaacagg aaaggaattg 240  
ttgtaa 246

<210> 55  
<211> 258  
<212> DNA  
<213> E. coli Plasmid R100

<400> 55  
atgcatacca cccgactgaa gagggttggc ggctcagtt tgctgaccgt cccaccggca 60  
ctgctgaatg cgctgtctct gggcacagat aatgaagttg gcatggtcat tgataatggc 120  
cggctgattg ttgagccgta cagacgcccc caatattcac tggctgagct actggcacag 180  
tgtgatccga atgctgaaat atcagctgaa gaacgagaat ggctggatgc accggcgact 240  
ggtcaggagg aaatctga 258

<210> 56  
<211> 294  
<212> DNA  
<213> E. coli Plasmid R466b

<400> 56

atgttatatt taaatataac ttttatggag gaaaaaatgc ataccactcg actgaagaag 60  
gttggcgct cagtcatgtc gaccgtccc ccggcactgc tgaatgcgt gtcgctgggt 120  
acagataatg aagttggcat ggtcattgtat aatggccggc tgattgtgga gccgcacaga 180  
cgccccgact attcaactggc tgagctgttgc gcacagtgcg atccgaacgc tgaaatctcg 240  
gcagaagaac gtgaatggct ggatgcgccg gcggctggtc aggaggaaat ctga 294

<210> 57  
<211> 258  
<212> DNA  
<213> Escherichia coli

<400> 57  
gtgcagatgc gtattaccat aaaaagatgg gggAACAGTG CAGGTATGGT CATTCCAAAT 60  
atcgtaatga aagaacttaa CTTACAGCCG GGGCAGAGCG TTGAAGTGC AAGTCGACAC 120  
aaccaactga ttctgacacc CATCTCCAGG CGCTACTCGC TTGATGAACT GCTGGCACAG 180  
tgtgacatga acgCCGCGGA ACTTAGCGAG CAGGATGTCT GGGGTAATC CACCCCTGCG 240  
ggtgacgaaa tatggtaa 258

<210> 58  
<211> 255  
<212> DNA  
<213> Pseudomonas putida

<400> 58  
atgcagatca agattcaaca gtggggcaac agcgccgcga tccgcttgcc cgccgcagta 60  
ctcaaggcaga tgcgcctcgg tgtcggctcc accctgagcc ttgacacacaac gggtgagacg 120  
atggtgctca aaccgcgtcag gtcgaaaccc aagtacaccc ttgaggaact gatggccca 180  
tgtgacctga gtgcaccggc gccagaggac atggccgact ggaatgccat gcccgcgtg 240  
ggcgtgaag tgtga 255

<210> 59  
<211> 260  
<212> DNA  
<213> Photobacterium profundum

<400> 59  
gtgcaatgag aactcagata agaaagatcg gtaactcact tggttcaatt attcctgcca 60  
cttttattcg tcagcttcaa ctggcagagg ggcgcagaaat tgatgttaaa acggttgtatg 120  
aaaaaaattgt gattgagcca attagaaaaa tgaaaaaaacg tttcccatc agtgagcgtg 180  
aattactaag tggattggat gcacacactg ctcatgctga cgaactgggtt gtaatttcta 240  
cccaggagct aggcgaataa 260

<210> 60  
<211> 80  
<212> PRT  
<213> Deinococcus radiodurans

<400> 60  
Met Thr Ser Gln Ile Gln Lys Trp Gly Asn Ser Leu Ala Leu Arg Ile  
1 5 10 15  
Pro Lys Ala Leu Ala Gln Gln Val Gly Leu Thr Gln Ser Ser Glu Val  
20 25 30  
Glu Leu Leu Leu Gln Asp Gly Gln Ile Val Ile Arg Pro Val Pro Ala  
35 40 45  
Arg Gln Tyr Asp Leu Ala Ala Leu Leu Ala Glu Met Thr Pro Glu Asn  
50 55 60  
Leu His Gly Glu Thr Asp Trp Gly Ala Leu Glu Gly Arg Glu Glu Trp  
65 70 75 80

<210> 61  
<211> 81  
<212> PRT  
<213> *Bacillus halodurans*

<400> 61  
Met Thr Leu Met Thr Thr Ile Gln Lys Trp Gly Asn Ser Leu Ala Val  
1 5 10 15  
Arg Ile Pro Asn His Tyr Ala Lys His Ile Asn Val Thr Gln Gly Ser  
20 25 30  
Glu Ile Glu Leu Ser Leu Gly Ser Asp Gln Thr Ile Ile Leu Lys Pro  
35 40 45  
Lys Lys Arg Lys Pro Thr Leu Glu Glu Leu Val Ala Lys Ile Thr Pro  
50 55 60  
Glu Asn Arg His Asn Glu Ile Asp Phe Gly Arg Thr Gly Lys Glu Leu  
65 70 75 80  
Leu

<210> 62  
<211> 85  
<212> PRT  
<213> *E. coli* PemI plasmid R100

<400> 62  
Met His Thr Thr Arg Leu Lys Arg Val Gly Gly Ser Val Met Leu Thr  
1 5 10 15  
Val Pro Pro Ala Leu Leu Asn Ala Leu Ser Leu Gly Thr Asp Asn Glu  
20 25 30  
Val Gly Met Val Ile Asp Asn Gly Arg Leu Ile Val Glu Pro Tyr Arg  
35 40 45  
Arg Pro Gln Tyr Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn  
50 55 60  
Ala Glu Ile Ser Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Thr  
65 70 75 80  
Gly Gln Glu Glu Ile  
85

<210> 63  
<211> 97  
<212> PRT  
<213> *E. coli* PemI plasmid R466b

<400> 63  
Met Leu Tyr Leu Asn Ile Thr Phe Met Glu Gly Lys Met His Thr Thr  
1 5 10 15  
Arg Leu Lys Lys Val Gly Gly Ser Val Met Leu Thr Val Pro Pro Ala  
20 25 30  
Leu Leu Asn Ala Leu Ser Leu Gly Thr Asp Asn Glu Val Gly Met Val  
35 40 45  
Ile Asp Asn Gly Arg Leu Ile Val Glu Pro His Arg Arg Pro Gln Tyr  
50 55 60  
Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn Ala Glu Ile Ser  
65 70 75 80  
Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Ala Gly Gln Glu Glu  
85 90 95  
Ile

<210> 64

<211> 85  
<212> PRT  
<213> Escherichia coli

<400> 64  
Met Gln Met Arg Ile Thr Ile Lys Arg Trp Gly Asn Ser Ala Gly Met  
1 5 10 15  
Val Ile Pro Asn Ile Val Met Lys Glu Leu Asn Leu Gln Pro Gly Gln  
20 25 30  
Ser Val Glu Ala Gln Val Ser Asn Asn Gln Leu Ile Leu Thr Pro Ile  
35 40 45  
Ser Arg Arg Tyr Ser Leu Asp Glu Leu Leu Ala Gln Cys Asp Met Asn  
50 55 60  
Ala Ala Glu Leu Ser Glu Gln Asp Val Trp Gly Lys Ser Thr Pro Ala  
65 70 75 80  
Gly Asp Glu Ile Trp  
85

<210> 65  
<211> 84  
<212> PRT  
<213> Pseudomonas putida

<400> 65  
Met Gln Ile Lys Ile Gln Gln Trp Gly Asn Ser Ala Ala Ile Arg Leu  
1 5 10 15  
Pro Ala Ala Val Leu Lys Gln Met Arg Leu Gly Val Gly Ser Thr Leu  
20 25 30  
Ser Leu Asp Thr Thr Gly Glu Thr Met Val Leu Lys Pro Val Arg Ser  
35 40 45  
Lys Pro Lys Tyr Thr Leu Glu Glu Leu Met Ala Gln Cys Asp Leu Ser  
50 55 60  
Ala Pro Glu Pro Glu Asp Met Ala Asp Trp Asn Ala Met Arg Pro Val  
65 70 75 80  
Gly Arg Glu Val

<210> 66  
<211> 85  
<212> PRT  
<213> Photobacterium profundum

<400> 66  
Ala Met Arg Thr Gln Ile Arg Lys Ile Gly Asn Ser Leu Gly Ser Ile  
1 5 10 15  
Ile Pro Ala Thr Phe Ile Arg Gln Leu Glu Leu Ala Glu Gly Ala Glu  
20 25 30  
Ile Asp Val Lys Thr Val Asp Gly Lys Ile Val Ile Glu Pro Ile Arg  
35 40 45  
Lys Met Lys Lys Arg Phe Pro Phe Ser Glu Arg Glu Leu Leu Ser Gly  
50 55 60  
Leu Asp Ala His Thr Ala His Ala Asp Glu Leu Val Val Ile Ser Thr  
65 70 75 80  
Gln Glu Leu Gly Glu  
85

<210> 67  
<211> 228  
<212> DNA  
<213> Homo sapiens

> <400> 67  
atgggtccag catctgttcc gactacctgt tgcttaacc tggcgaaccg caaaattccg 60  
ctgcagcgcc tggaaagcta tcgcccgtatt acctctggca aatgcccgcg gaaagcggtg 120  
atcttiaaaa ccaaactggc gaaagatatt tgcgccggatc cgaaaaaaaa atgggtgcag 180  
gattctatga aatatctgga tcagaaaatct ccgaccccgaa aaccgtaa 228

<210> 68  
<211> 73  
<212> PRT  
<213> Homo sapiens

<400> 68  
Gly Pro Ala Ser Pro Thr Thr Cys Cys Phe Asn Leu Ala Asn Arg Lys  
1 5 10 15  
Ile Pro Leu Gln Arg Leu Glu Ser Tyr Arg Arg Ile Thr Ser Gly Lys  
20 25 30  
Cys Pro Gln Lys Ala Val Ile Phe Lys Thr Lys Leu Ala Lys Asp Ile  
35 40 45  
Cys Ala Asp Pro Lys Lys Trp Val Gln Asp Ser Met Lys Tyr Leu  
50 55 60  
Asp Gln Lys Ser Pro Thr Pro Lys Pro  
65 70

<210> 69  
<211> 357  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 69  
gtgatgcgcc gcggtgagat ttggcagggtc gatctcgacc ccgctcgagg tagcgaagcg 60  
aacaaccagc gccccgcccgt cgtcgtcagc aacgaccggg ccaacgcgcac cgccacgcgt 120  
cttgggcgcg gcgtcatcac cgtcgccgt gtgacgagca acatcgccaa ggtcttatccg 180  
tttcaggtgt tttgtcggtc caccactact ggtctccagg tcgactgcaa ggcgcaggcc 240  
gagcaaatca gatcgattgc taccgagcgg ttgctccggc caatcgcccg agtttcagcc 300  
gccgaacttg cccagctcgta tgaggctttg aaactgcata tcgacttatg gtcgttag 357

<210> 70  
<211> 282  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 70  
atgctgcgcg gtgagatctg gcagggtcgac ctggatccgg cccgcggcag cgcggcaaat 60  
atgcggcgcc cagcgtaat tgtcagcaac gacagggcca acgctgccgc gatacgctc 120  
gaccgaggcg tggtgccggt tgtcccggtt accagcaaca ccgaaaaaggt ccccattcca 180  
ggtgttggttc cccgcagcga gcgggtggcct ggccgtcgat tcgaaaggcgc aggcccagca 240  
ggttggatcc gtcgctgcgc aacgtctccc ctgcccagct ga 282

<210> 71  
<211> 345  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 71  
gtggtgatta gtcgtccga gatctactgg gctgacctcg ggccgcattc aggcaagtca 60  
ccggcgaagc gcccgggt gtcgtaatc cagtcagatc cgtacaacgc aagtgcctt 120  
gccactgtga tcgcagcggt gatcacgtcc aatacggcgc tggcggcaat gcccggcaac 180  
gtgttcttgc ccgcgaccac aacgcgactg ccacgtgact cggtcgtcaa cgtcacggcg 240

attgcacgc tcaacaagac tgacctcacc gaccgagttg gggaggtgcc agcgagctt 300  
atgcacgagg ttgaccgagg acttcgtcgc gtactggacc tttga 345

<210> 72

<211> 309

<212> DNA

<213> Mycobacterium tuberculosis

<400> 72

atgcggcgcg gtgaatttgt gtttgcgc acacctggtg gtgacagacc agtacttgtc 60  
cttaccagag atccgggtggc agaccgcac ggcgcggc tcgttgtgc cctaaccgc 120  
acccggcggag gcctgggtgc ggaattggag ctcacggccg tcgaaaaccg tggccgagc 180  
gactgcgtcg tcaacttcga caacattcat acgttgccac gcaccgcatt ccgacggcgc 240  
atcacccggc tggcccgac gaagcctgtc aaacactccg ggcgagcacg 300  
gggtgtta 309

<210> 73

<211> 330

<212> DNA

<213> Mycobacterium tuberculosis

<400> 73

gtgaccgcac ttccggcgcg cggagaggtg tgggtgtgt agatggctga gatcggtcg 60  
cgaccagtgc tcgtgtgtc gcgcgatgcc gcgcgcgc ggctgcacg cgcaacttgtc 120  
gcgcgcgtca ccacgaccat ccgagggtca gccagtggagg ttgttcttga acccggttcc 180  
gaccggatcc cgccgcgttc cgccgtgaat ttggacttag tcgaaagtgt ctgcgtcg 240  
gtattggtga atcggcttgg ccgcctcgcc gacatccgga tgccgcctcat ctgcacggcc 300  
ctcgaggctcg ccgtcgattt ctctcgatga 330

<210> 74

<211> 118

<212> PRT

<213> Mycobacterium tuberculosis

<400> 74

Met Met Arg Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg  
1 5 10 15  
Gly Ser Glu Ala Asn Asn Gln Arg Pro Ala Val Val Val Ser Asn Asp  
20 25 30  
Arg Ala Asn Ala Thr Ala Thr Arg Leu Gly Arg Gly Val Ile Thr Val  
35 40 45  
Val Pro Val Thr Ser Asn Ile Ala Lys Val Tyr Pro Phe Gln Val Leu  
50 55 60

Leu Ser Ala Thr Thr Thr Gly Leu Gln Val Asp Cys Lys Ala Gln Ala  
65 70 75 80  
Glu Gln Ile Arg Ser Ile Ala Thr Glu Arg Leu Leu Arg Pro Ile Gly  
85 90 95  
Arg Val Ser Ala Ala Glu Leu Ala Gln Leu Asp Glu Ala Leu Lys Leu  
100 105 110  
His Leu Asp Leu Trp Ser  
115

<210> 75

<211> 93

<212> PRT

<213> Mycobacterium tuberculosis

<400> 75

Met Leu Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg Gly  
1 5 10 15  
Ser Ala Ala Asn Met Arg Arg Pro Ala Val Ile Val Ser Asn Asp Arg  
20 25 30

, Ala Asn Ala Ala Ala Ile Arg Leu Asp Arg Gly Val Val Pro Val Val  
35 40 45  
Pro Val Thr Ser Asn Thr Glu Lys Val Pro Ile Pro Gly Val Val Ala  
50 55 60  
Gly Ser Glu Arg Trp Pro Gly Arg Arg Phe Glu Gly Ala Gly Pro Ala  
65 70 75 80  
Gly Trp Ile Arg Arg Cys Ala Thr Ser Pro Leu Pro Ser  
85 90

<210> 76  
<211> 114  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 76  
Met Val Ile Ser Arg Ala Glu Ile Tyr Trp Ala Asp Leu Gly Pro Pro  
1 5 10 15  
Ser Gly Ser Gln Pro Ala Lys Arg Arg Pro Val Leu Val Ile Gln Ser  
20 25 30  
Asp Pro Tyr Asn Ala Ser Arg Leu Ala Thr Val Ile Ala Ala val Ile  
35 40 45  
Thr Ser Asn Thr Ala Leu Ala Ala Met Pro Gly Asn Val Phe Leu Pro  
50 55 60  
Ala Thr Thr Thr Arg Leu Pro Arg Asp Ser Val Val Asn Val Thr Ala  
65 70 75 80  
Ile Val Thr Leu Asn Lys Thr Asp Leu Thr Asp Arg Val Gly Glu Val  
85 90 95  
Pro Ala Ser Leu Met His Glu Val Asp Arg Gly Leu Arg Arg Val Leu  
100 105 110  
Asp Leu

<210> 77  
<211> 102  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 77  
Met Arg Arg Gly Glu Leu Trp Phe Ala Ala Thr Pro Gly Gly Asp Arg  
1 5 10 15  
Pro Val Leu Val Leu Thr Arg Asp Pro Val Ala Asp Arg Ile Gly Ala  
20 25 30  
Val Val Val Ala Leu Thr Arg Thr Arg Arg Gly Leu Val Ser Glu  
35 40 45  
Leu Glu Leu Thr Ala Val Glu Asn Arg Val Pro Ser Asp Cys Val Val  
50 55 60  
Asn Phe Asp Asn Ile His Thr Leu Pro Arg Thr Ala Phe Arg Arg Arg  
65 70 75 80  
Ile Thr Arg Leu Ser Pro Ala Arg Leu His Glu Ala Cys Gln Thr Leu  
85 90 95  
Arg Ala Ser Thr Gly Cys  
100

<210> 78  
<211> 109  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 78  
Met Thr Ala Leu Pro Ala Arg Gly Glu Val Trp Trp Cys Glu Met Ala  
1 5 10 15

Glu Ile Gly Arg Arg Pro Val Val Val Leu Ser Arg Asp Ala Ala Ile  
 20 25 30  
 Pro Arg Leu Arg Arg Ala Leu Val Ala Pro Cys Thr Thr Ile Arg  
 35 40 45  
 Gly Leu Ala Ser Glu Val Val Leu Glu Pro Gly Ser Asp Pro Ile Pro  
 50 55 60  
 Arg Arg Ser Ala Val Asn Leu Asp Ser Val Glu Ser Val Ser Val Ala  
 65 70 75 80  
 Val Leu Val Asn Arg Leu Gly Arg Leu Ala Asp Ile Arg Met Arg Ala  
 85 90 95  
 Ile Cys Thr Ala Leu Glu Val Ala Val Asp Cys Ser Arg  
 100 105

<210> 79  
 <211> 351  
 <212> DNA  
 <213> *Bacillus anthracis*

<400> 79  
 ttgattgtaa aacgcggcga cgtgtatTTT gcagacCTT cccCAGTTGT tggTTCTGAG 60  
 caaggaggTG ttcgtCCGGT tCTTGTcATT caaaATgaca tcggAAATCG ttttagTCGA 120  
 acggTgATTG tagCGGCTAT tactGCACAG attcaAAAAG cgaardtacc cactcatgtG 180  
 gaaattgatG cgaaaaAGTA CGGTTTGAG agagattCTG ttatTTTACT tgAGCAGATT 240  
 cgaacaATCG ataAGCAGCG cttaACGGAC aaaATCACTC acttagatGA agtgatGATG 300  
 attcgtGTA G atgaAGCGCT acaaattAGT ttGAGCTAA tagatTTTA a 351

<210> 80  
 <211> 116  
 <212> PRT  
 <213> *Bacillus anthracis*

<400> 80  
 Met Ile Val Lys Arg Gly Asp Val Tyr Phe Ala Asp Leu Ser Pro Val  
 1 5 10 15  
 Val Gly Ser Glu Gln Gly Gly Val Arg Pro Val Leu Val Ile Gln Asn  
 20 25 30  
 Asp Ile Gly Asn Arg Phe Ser Pro Thr Val Ile Val Ala Ala Ile Thr  
 35 40 45  
 Ala Gln Ile Gln Lys Ala Lys Leu Pro Thr His Val Glu Ile Asp Ala  
 50 55 60  
 Lys Lys Tyr Gly Phe Glu Arg Asp Ser Val Ile Leu Leu Glu Gln Ile  
 65 70 75 80  
 Arg Thr Ile Asp Lys Gln Arg Leu Thr Asp Lys Ile Thr His Leu Asp  
 85 90 95  
 Glu Val Met Met Ile Arg Val Asp Glu Ala Leu Gln Ile Ser Leu Gly  
 100 105 110  
 Leu Ile Asp Phe  
 115

<210> 81  
 <211> 348  
 <212> DNA  
 <213> *Pseudomonas putida*

<400> 81  
 gtgaaaacggT tgaattTCGc caggGGTgat attGTTcGcg tcaacCTGGA cccAACAGTC 60  
 gggcgggaaac agcaggGCTC cggCCGACCT gcactGGTAC ttactCCGGC tgcgttcaat 120  
 gcttcaggCC tggCTGtaat catCCCGATC actcaAGGTG gggattTCGc gaggcatGCG 180  
 ggTTcGCTG tcacGCTCAG cggTGCggGC acgcAGACTC agggGGGTGAT gctttGcaac 240  
 caggTGCgca cagtGcACCT tgaAGCACGA tttGccaAGC gcataGAGTC ggtgcctGaa 300  
 gctgtcatCC tggatGcACT ggcgcgtgtG caaacCCtat tcgattaa 348

<210> 82  
<211> 345  
<212> DNA  
<213> Mycobacterium celatum

<400> 82  
tgaattgctc tgacggaacg cggcgacatc tacatcgttt cgcttgcacc gacgtcgaaa 60  
catgagcaga gccccacgcg cccagtattt gtcgtgtccc cggcgccgtt taatcgccctg 120  
acgaaaaacac cgggtcggtct acctataaca cgcggcgaaa actttgcctg aacggcagg 180  
ttcgctgtct cgctgaccga tgcgggtact cgcaccgcg gctgttaatcg ctgcgatcag 240  
cctcgctcga ttgatatccg cgcccgtaaa ggccgcaagg ttgaacgtgt gccgtctggg 300  
gttcttgacg aaggcggtggc caagctcgcc acgatcttga cttga 345

<210> 83  
<211> 366  
<212> DNA  
<213> Shigella flexneri 2a str. 301

<400> 83  
atggtaaaagg cacggacgcc acatcggtt gagatctgtt attttaaccc tgatccgggtt 60  
gccccggcatg aacttcaggg gccacattat tgcattgtgg taacggacaa aaaactcaac 120  
aatgttttaa aagttgttat gtgctgcccgtt atttcaacag gggcaaatgc agcacgttcc 180  
acaggggtga cggtaacgtt cctcccccgtt gatacgcaaa ccggtaacctt gcatggcggtt 240  
gtactttgtc accagctaaa agccgtcgat tttattgccc gtggcgctaa atttcatacc 300  
gttgccgatg aaaaattgtat tagtgaagttt atcagtaaac ttgtgaattt aatcgaccca 360  
caataaa 366

<210> 84  
<211> 351  
<212> DNA  
<213> E. coli

<400> 84  
atggtaaaaga aaagtgaatt tgaacgggaa gacattgtgc tgggtggctt tgatccagca 60  
agcggccatg aacagcaagg tgctggtcga cctgcgttgc tgctctccgt tcaaggccctt 120  
aatcaactgg gaatgacgcgtt ggtggccccc attacgcagg gcgaaattt tgcccggttat 180  
gccccggattna gcgttcctttt acattgcgaa gaaggcgatg tgccacggcgtt ggtgctgtt 240  
aatcaggtgc ggatgatgga tctacacgcc cggctggcaa agcgtattttt tctggctgcg 300  
gatgaggtgg tggaaagaggc gttattacgc ttgcaggcgg tgggtggaaata a 351

<210> 85  
<211> 115  
<212> PRT  
<213> Pseudomonas putida

<400> 85  
Met Lys Arg Leu Lys Phe Ala Arg Gly Asp Ile Val Arg Val Asn Leu  
1 5 10 15  
Asp Pro Thr Val Gly Arg Glu Gln Gln Gly Ser Gly Arg Pro Ala Leu  
20 25 30  
Val Leu Thr Pro Ala Ala Phe Asn Ala Ser Gly Leu Ala Val Ile Ile  
35 40 45  
Pro Ile Thr Gln Gly Gly Asp Phe Ala Arg His Ala Gly Phe Ala Val  
50 55 60  
Thr Leu Ser Gly Ala Gly Thr Gln Thr Gln Gly Val Met Leu Cys Asn  
65 70 75 80  
Gln Val Arg Thr Val Asp Leu Glu Ala Arg Phe Ala Lys Arg Ile Glu  
85 90 95  
Ser Val Pro Glu Ala Val Ile Leu Asp Ala Leu Ala Arg Val Gln Thr  
100 105 110  
Leu Phe Asp  
115

<210> 86  
<211> 111  
<212> PRT  
<213> Mycobacterium celatum

<400> 86  
Met Thr Glu Arg Gly Asp Ile Tyr Ile Val Ser Leu Asp Pro Thr Ser  
1 5 10 15  
Gly His Glu Gln Ser Gly Thr Arg Pro Val Leu Val Val Ser Pro Gly  
20 25 30  
Ala Phe Asn Arg Leu Thr Lys Thr Pro Val Val Leu Pro Ile Thr Arg  
35 40 45  
Gly Gly Asn Phe Ala Arg Thr Ala Gly Phe Ala Val Ser Leu Thr Asp  
50 55 60  
Ala Gly Thr Arg Thr Ala Gly Val Ile Arg Cys Asp Gln Pro Arg Ser  
65 70 75 80  
Ile Asp Ile Arg Ala Arg Lys Gly Arg Lys Val Glu Arg Val Pro Ser  
85 90 95  
Gly Val Leu Asp Glu Ala Leu Ala Lys Leu Ala Thr Ile Leu Thr  
100 105 110

<210> 87  
<211> 121  
<212> PRT  
<213> Shigella flexneri 2a str. 301

<400> 87  
Met Val Lys Ala Arg Thr Pro His Arg Gly Glu Ile Trp Tyr Phe Asn  
1 5 10 15  
Pro Asp Pro Val Ala Gly His Glu Leu Gln Gly Pro His Tyr Cys Ile  
20 25 30  
Val Val Thr Asp Lys Lys Leu Asn Asn Val Leu Lys Val Ala Met Cys  
35 40 45  
Cys Pro Ile Ser Thr Gly Ala Asn Ala Ala Arg Ser Thr Gly Val Thr  
50 55 60  
Val Asn Val Leu Pro Arg Asp Thr Gln Thr Gly Asn Leu His Gly Val  
65 70 75 80  
Val Leu Cys His Gln Leu Lys Ala Val Asp Leu Ile Ala Arg Gly Ala  
85 90 95  
Lys Phe His Thr Val Ala Asp Glu Lys Leu Ile Ser Glu Val Ile Ser  
100 105 110  
Lys Leu Val Asn Leu Ile Asp Pro Gln  
115 120

<210> 88  
<211> 116  
<212> PRT  
<213> E. coli

<400> 88  
Met Val Lys Lys Ser Glu Phe Glu Arg Gly Asp Ile Val Leu Val Gly  
1 5 10 15  
Phe Asp Pro Ala Ser Gly His Glu Gln Gln Gly Ala Gly Arg Pro Ala  
20 25 30  
Leu Val Leu Ser Val Gln Ala Phe Asn Gln Leu Gly Met Thr Leu Val  
35 40 45

Ala Pro Ile Thr Gln Gly Gly Asn Phe Ala Arg Tyr Ala Gly Phe Ser  
50 55 60  
Val Pro Leu His Cys Glu Glu Gly Asp Val His Gly Val Val Leu Val  
65 70 75 80  
Asn Gln Val Arg Met Met Asp Leu His Ala Arg Leu Ala Lys Arg Ile  
85 90 95  
Gly Leu Ala Ala Asp Glu Val Val Glu Glu Ala Leu Leu Arg Leu Gln  
100 105 110  
Ala Val Val Glu  
115

<210> 89  
<211> 17  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> synthetic oligonucleotide

<400> 89  
aatgatgaca ctggaag 17

<210> 90  
<211> 17  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> synthetic oligonucleotide

<400> 90  
gtcggtgaca ttgatgg 17

<210> 91  
<211> 17  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> synthetic oligonucleotide

<400> 91  
atctcgaaca cgcagcc 17

<210> 92  
<211> 17  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> synthetic oligonucleotide

<400> 92  
tcgtttaca cccttga 17